

SOME FOSSIL INSECTS FROM FLORISSANT, COLORADO.

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When visiting the United States National Museum during the summer of 1911, I examined the collection of fossil insects, and picked out three undetermined species which were of special interest, asking permission to study them. These are reported on herewith. The specimens are from the Miocene shales at Florissant, Colorado, and form a part of the Gustav Hambach collection. I have added descriptions of two Hymenoptera collected at Florissant in 1912.

Order NEUROPTERA Linnæus.

Family HEMEROBIIDÆ Stephens, emend. Westwood.

The Hemerobiidæ, as understood by most authors, are divided by Handlirsch into several families, namely, Dilaridæ, Osmylidæ, Polystæchotidæ, Sisyridæ, Nymphesidæ, and Hemerobiidæ. Of these, the Hemerobiidæ proper are abundantly represented in the North American fauna, while (according to Banks, as shown by his recent catalogue) we have two species of *Polystæchotes*, one each of *Sisyra* and *Climacia* (Sisyridæ), and one of *Dilar*. The Osmylidæ are not represented. In the Miocene shales of Florissant we find instead one *Polystæchotes*, two Osmylidæ, and no Hemerobiidæ; Sisyridæ, or Dilaridæ. Probably not much importance should be attached to the apparent absence of several groups, but the existence of Osmylidæ, an Old World group, is significant, and in harmony with other facts, such as the occurrence of a species of Nemopteridæ in the shales.

Osmylus, although made the type of a distinct family Osmylidæ by Handlirsch, according to the more usual classification falls in Hemerobiidæ, where, however, it will at least typify a subfamily Osmylinæ.

Genus OSMYLIDIA Cockerell.

OSMYLIDIA REQUIETA (Scudder).

Osmylus requietus SCUDDER, Tertiary Insects N. America, 1890, p. 162.

Osmylidia requieta (SCUDDER), COCKERELL, Canadian Entomologist, vol. 40, 1908, p. 342.

Scudder described one of the Florissant Osmylids as *Osmylus requietus*. He prefaced his account¹ with the following remarks:

The species we have placed here agrees somewhat closely with the species from amber, *Osmylus pictus*, referred by Hagen to this genus, but differs from it in its lack of any diverse coloring in the wings, as well as in some minor points of the venuration, as in the distance of the outer series of gradate veinlets from the outer border of the wing, their regular connection with one of the basal branches of the radius, the regularity of the inner series of gradate veinlets, as well as the structure of the cubital region. The two Tertiary species, however, agree together, and disagree with the living types in the simple character of the costal nervules, the much smaller number of sectors, and the character of the basal half of the wing, where the sectorial interspaces are regular and broken by few and irregularly scattered cross veins, instead of being so numerously supplied as to break up the field into an almost uniform and minute reticulation. The two fossil species would therefore appear to form a section apart.

I found *Osmylus requietus* Scudder in the shale at station 13 of the Florissant region. The specimen agreed with Scudder's type, except that it was a little smaller, the wings 14 mm. long instead of over 15.

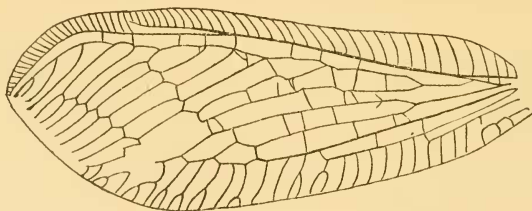


FIG. 1.—VENATION OF OSMYLIDIA REQUIETA (SCUDDER).

The insect differs conspicuously from typical *Osmylus* in the characters mentioned by Scudder, and on it I founded a new genus *Osmylidia*.² Whether the species from Baltic amber should be considered strictly cogenetic, I will not venture to decide. In many of its characters this genus resembles the very much older *Nymphites crameri* Haase, from the lithographic stone of Bavaria; indeed, it may fairly be said that *Osmylidia* is intermediate between *Nymphites* of the Jurassic and *Osmylus* of the present day.

¹ Tertiary Insects, p. 162.

² Can. Ent., vol. 40, 1908, p. 342.

This species is represented in the United States National Museum by a good specimen, showing the body, antennæ, and wings, and confirming the generic characters. I give a new figure of an anterior wing (fig. 1), kindly drawn for me by Miss June M. Ashley.

Plesiotype.—Cat. No. 58681, U.S.N.M.

Order LEPIDOPTERA Linnæus.

Family NYMPHALIDÆ.

Genus CHLORIPPE Boisduval.

CHLORIPPE WILMATTE Cockerell.

Plate 56, fig. 3.

Chlorippe wilmattæ COCKERELL, Canadian Entomologist, vol. 39, 1907, p. 361.

The specimen belonging to the United States National Museum is not so well preserved as the type, but it shows the abdomen and more or less of the hind wings. The abdomen is quite broad (largely as the result of pressure, no doubt), dusky, with the sutures rather broadly pallid. The venation of the hind wing is partly preserved and is as in *Chlorippe* and allied genera. The shape of the hind wing seems to have been as in normal females of the genus. It is difficult to make out the markings of the hind wing, but the submarginal pale band is faintly indicated, and the usual row of spots in the interspaces was evidently present, though apparently they were light, without dark centers. There are also indications of a pale spot at the base of the cell between the media and cubitus, one of the series of pale spots crossing the hind wing in males of modern *Chlorippe*.

Plesiotype.—Cat. No. 58682, U.S.N.M.

Order ORTHOPTERA Latreille.

Family MANTIDÆ.

EOBRUNERIA, new genus.

The generic characters are included in the description of the following species which is the type of the genus.

EOBRUNERIA TESSELLATA, new species.

Plate 56, figs. 1, 2.

Tegmen about 33 mm. long and $11\frac{1}{2}$ mm. wide; the costal field about middle of tegmen one-third of total width. In the costal field are longitudinal brown bands, and on the lower two-thirds of the wing broad oblique ones, all broken up by cross veins into little square blocks. Although the markings, as shown in the figures, are

very distinct, the lens or microscope shows no additional details, and it is impossible to say more about the venation than that it appears to be perfectly normal for a mantid with a broad costal field, such as the female of *Stagmomantis limbata* (Hahn). The tessellated markings resemble those of the lower wings of *Stagmomantis* and other mantids.

I had taken this for a locustid, and made many efforts to find something similar in the modern fauna, both by examining the literature and consulting specialists in the group. Here I failed entirely, but Prof. L. Bruner, to whom I sent a photograph, remarked that the insect looked to him more like a mantid, and once having this clue I soon became convinced that it belonged to that family.

Holotype.—Cat. No. 58683, U.S.N.M.

Order HYMENOPTERA Linnæus.

Family PANURGIDÆ.

Genus LIBELLULAPIS Cockerell.

LIBELLULAPIS WILMATTÆ, new species.

Female.—Length $13\frac{1}{2}$ mm., anterior wing about 8 mm.; rather robust; the head and thorax were apparently black, the abdomen pale (as preserved very pale reddish, with faint suffused bands, only that on the fourth segment conspicuous, the apex also a little darkened); head very broad, its breadth 5 mm., being the same as that of the thorax in the region of the wings; ocelli rather large; legs broadly hairy; abdomen with a heavy apical fringe of hair, but no ventral scopæ; wings hyaline, reddish, stigma and nervures ferruginous; pygidial plate broad at base, then rapidly narrowing, but expanding apically, though of course much narrower there than at base.

Marginal cell long, pointed, though not very sharply, the point only a very short distance from costa; stigma rather well developed (considerably larger than in *Lithurgus*, etc.); two submarginal cells, the second very long, considerably longer than the first; basal nervure straight, except for a slight bend at its lower end; basal nervure meeting transversomedial, the latter strongly oblique, the lower end more apical; second submarginal cell receiving both recurrent nervures, the first some distance from the base, the other about one-fourth of this distance from the apex; second recurrent nervure with a gentle curve.

Hind wing with the venation ordinary, except that the distance from the upper end of the transversomedial nervure to the beginning of the discoidal cell is much less than the side of the discoidal cell on the median cell. (This peculiarity is also observed, though less pronounced, in *Panurgus*, especially *P. calcaratus*; the second submarginal cell is also very long in *Panurgus*.)

Wing measurements in microns:

Depth of stigma, about.....	368
Length of marginal cell.....	2,320
Width (depth) of marginal cell.....	528
Marginal cell on first submarginal.....	352
Marginal cell on second submarginal.....	880
Marginal cell from second (morphologically third) transversocubital nerve to apex.....	1,312
Basal nerve on first submarginal cell.....	400
Basal nerve on first discoidal cell (not allowing for curvature).....	1,280
Length (diagonal) of first submarginal cell.....	1,408
Length of second submarginal cell.....	1,728
Second submarginal cell on first discoidal.....	480
Second submarginal cell on third discoidal.....	1,120
Second submarginal cell from insertion of second recurrent nerve to apical appendicular nerve.....	112
Second discoidal cell on third.....	592
Apical side of second discoidal cell below third discoidal.....	352

Hind wing:

Upper end of transversomedial nerve to basal corner of discoidal cell (352 in <i>L. antiquorum</i>).....	880
Discoidal cell on median (not allowing for curvature) (640 in <i>L. antiquorum</i>)..	1,216



FIG. 2.—PYGIDIAL PLATE OF LIBELLULAPIS WILMATTE.

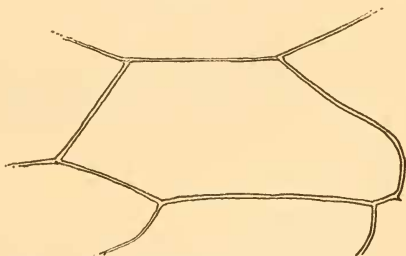


FIG. 3.—SECOND SUBMARGINAL CELL OF LIBELLULAPIS WILMATTE.

The lower side of the first submarginal cell is faintly arched downwards, but almost straight.

This seems certainly to belong to *Libellulapis*, which was based¹ on a species (*L. antiquorum* Cockerell) collected by Scudder in the Florissant shales. A reconsideration of the genus leads me to place in the Panurgidæ, where, by reason of certain features of the venation, it appears to stand rather near to *Panurgus*. The broad head, with prominent eyes, is also suggestive of certain forms of *Panurgus*. The pygidial plate is rather approached by that of *Dasygoda*.

In *Libellulapis* (both species) the side of the stigma on the marginal cell is practically straight; in *Pelandrena* (which has a proportionally

¹ Bull. Mus. Comp. Zool., vol. 50, No. 2, 1906, p. 42.

larger stigma) it is convex; in *Biareolina neglecta* it is conspicuously angulate or subdentata about the middle.

Libellulapis wilmattæ is easily known from *L. antiquorum* by its much larger size.

Habitat.—Miocene shales of Florissant, at Wilson's ranch; collected July, 1912, by Wilmatte P. Cockerell.

Holotype.—Cat. No. 58688, U.S.N.M.

Family CEPHIDÆ.

Genus JANUS Stephens.

JANUS DISPERDITUS, new species.

Length 13 mm., but apex of abdomen (probably 1 mm.) missing; anterior wing $8\frac{3}{4}$ mm.; width of abdomen (flattened) $3\frac{1}{2}$ mm., of thorax 3 mm.; the head was apparently black, or at least very dark; the thorax dark brown, but paler than head; the abdomen and legs apparently ferruginous; wings clear, with ferruginous nervures.

The venation of anterior wings agrees almost exactly with *Janus integer*, as represented by MacGillivray,¹ except as follows:

(1) The veins are more robust, like those figured by MacGillivray for *J. abbreviatus*.

(2) The first (basal) marginal cell has its basal corner very acute, more as in *Macrocephus*.

(3) The first recurrent nervure exactly meets the first transversocubital, also as in *Macrocephus*.

(4) The second recurrent meets the second transversocubital.

(5) The basal nervure on first submarginal cell is shorter, as in *J. abbreviatus*. (The relative positions of the basal and transversomedial nervures are exactly as in *J. integer*, not as in *Macrocephus*).

(6) The stigma is formed as in *J. abbreviatus*. (More robust than in *Macrocephus*).

(7) The third submarginal cell is very long, longer than in *J. integer*, and quite unlike the relatively short cell of *Macrocephus*. The following measurements are in microns:

Second submarginal cell on lower side.....	1,232
Third submarginal cell on lower side.....	1,232
Third submarginal cell on apical side.....	784
Third submarginal cell on upper side.....	1,072

What can be seen of the hind wing seems normal for the genus, but the apex of the median cell (subcostal of Marlatt) is more acute than in *J. integer*, herein rather resembling *Macrocephus*.

Miocene shales of Florissant; 1912. Collected by W. P. Cockerell at the Wilson ranch. This is the first fossil cephid from America. Among the European fossils, this must fall nearest to *Electrocephalus strahlendorffii* Konow, from Baltic Amber.

Type.—In the collections in the University of Colorado.

¹Proc. U. S. Nat. Mus., vol. 29, pl. 43, fig. 93.